



New Frontiers Preproposal Conference

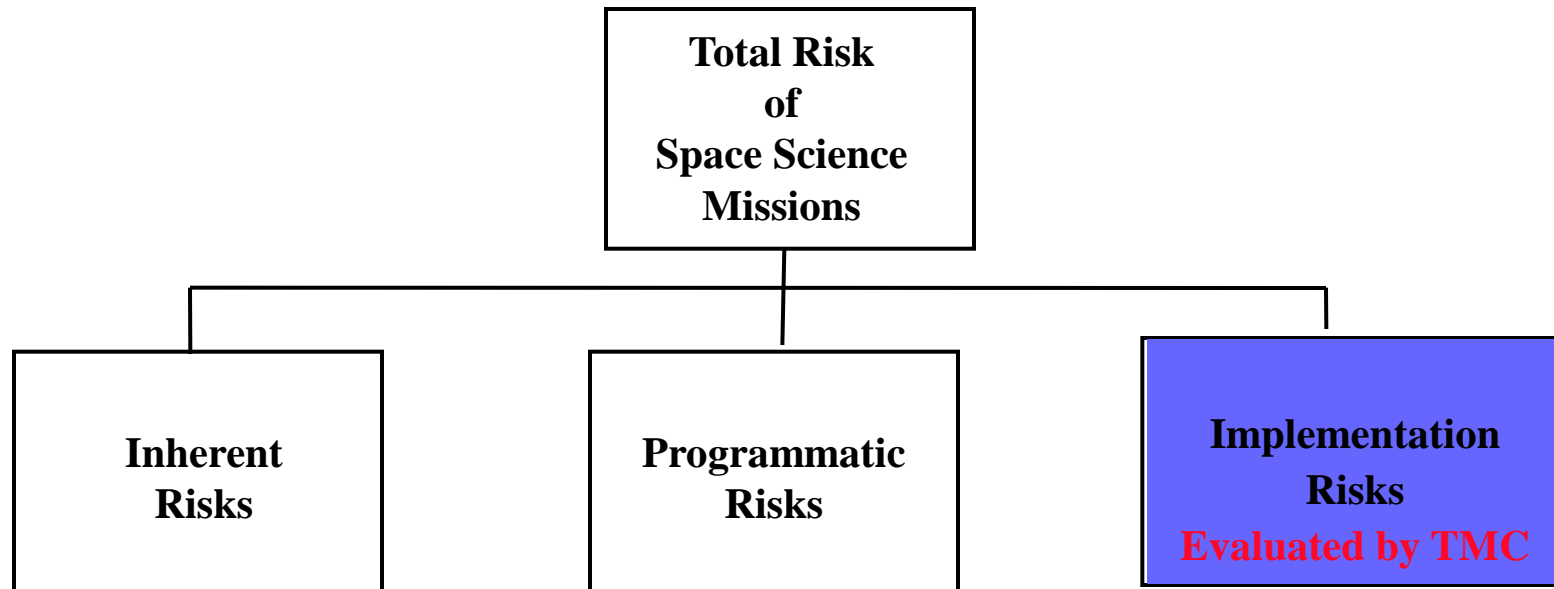
Technical, Management, and Cost Evaluation

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Risks for Space Science Missions



Risks that are unavoidable:

- Launch environments
- Space environments
- Unknowns
- Etc.

Risks that are beyond project control:

- Environmental Assessment approvals
- Budgetary uncertainties
- Political impacts
- Etc.

Risks associated with implementing the investigation:

- Adequacy of planning
- Adequacy of proposed resources
- Adequacy of management
- Adequacy of risk management
- Adequacy of development approach



TMC Evaluation Factors



The information provided in a proposal will be used to assess the implementation risk of the proposed investigation. The factors for implementation risk are the following:

Factor C-1. Adequacy and robustness of the technical plan. This factor includes assessment of implementation elements such as: the overall mission design and mission architecture; the spacecraft design and design margins; the plan for communication and navigation/tracking; and the proposer's understanding of the processes, products, and activities required to accomplish development and integration of all elements (flight systems, ground and data systems, etc.). This factor includes mission resiliency – the flexibility to recover from problems during both development and operations – including the technical resource reserves and margins, system and subsystem redundancy, and changes and descopes which can be implemented without impact to the Baseline Science Mission. The reliability of the proposed launch vehicle will be evaluated where the launch vehicle is not provided by NASA.

Factor C-2. Adequacy and robustness of the cost plan and schedule. This factor includes assessment of proposal elements such as cost and cost risk, the adequacy of the approach, the methods and rationale used to develop the estimated cost, the discussion of cost risks, the subcontracting plan, and the team's understanding of the scope of work (covering all elements of the mission, including contributions). Proposals will be evaluated for the adequacy of the cost reserves and whether proposals with inadequate cost reserves demonstrate a thorough understanding of the cost risks. This factor also includes assessment of proposal elements such as the relationship of the work to the project schedule, the project element interdependencies, the associated schedule margins, and an assessment of the likelihood of launching by the proposed launch date. Also evaluated under this factor are the proposed cost and schedule management tools to be used on the project.



TMC Evaluation Factors (continued)



Factor C-3. Adequacy of the management approach including the capability of the management team. This factor includes: the adequacy of the proposed organizational structure; the management approach; the roles, qualifications, and experience of the PI, PM, other named key management team members, and implementing organization, mission management team, and known partners; the commitment, spaceflight experience, and relevant performance of the PI, PM, other named key management team members, and implementing organization, mission management team, and known partners against the needs of the investigation; the commitments of partners and contributors; and the team's understanding of the scope of work covering all elements of the mission, including contributions.

Factor C-4. Adequacy of the risk management approach. The adequacy of the proposed risk management approach will be assessed, as will any risk mitigation plans for new technologies, any long-lead items, and the adequacy and availability of any required manufacturing, test, or other facilities. The approach to any proposed descoping of mission capabilities will be assessed against the proposed Baseline Science Mission. The plans for managing the risk of contributed critical goods and services will be assessed, including the commitment of partners and contributors, as documented in Letters of Commitment and the adequacy of contingency plans for coping with the failure of a proposed cooperative arrangement or contribution.



TMC Evaluation Factors (continued)



Factor C-5. Technical readiness. This factor includes the plans for the development and use of new technology and the adequacy of backup plans to ensure success of the mission when technologies having a TRL less than 6 are proposed. The maturity and technical readiness of the instrument complement, spacecraft, and operations systems will be assessed. The adequacy of the plan to mature systems within the proposed cost and schedule, the robustness of those plans, including recognition of risks and mitigation plans for retiring those risks, and the likelihood of success in developing any new technologies will be assessed.

The application and scope of any proposed use of NEXT or AMBR will be evaluated for appropriateness and conformance to the guidelines in Section 5.9.3 of the AO. The implementation feasibility and risk of the proposed use of NEXT or AMBR will be evaluated against the factors in this Section.

Student Collaboration proposals will be evaluated only for the impact they have on overall mission feasibility to the extent that they are not separable; student collaboration proposals will not be penalized in Step 1 for any inherent higher cost, schedule, or technical risk, as long as the student collaboration is shown to be clearly separable from the implementation of the baseline mission. The intrinsic merit of student collaborations will not be evaluated at this time.



TMC Principles for Evaluation



- **Basic Assumption:** Proposers are the experts on their proposals.
 - Proposer's task is to demonstrate that implementation risk is low.
 - TMC's task is to attempt to validate proposer's assertion of low risk.
 - Step-One proposals are based on pre-phase-A concepts. Accordingly, TMC assessments give benefit of the doubt to the Proposer.



TMC Evaluation Process



I. TMC Panel Composition and Organization

- The TMC panel is chaired by the Acquisition Manager, who is a Civil Servant in the Science Support Office (SSO) at Langley Research Center.
 - SSO works directly for NASA Headquarters and is firewalled from the rest of LaRC
- TMC evaluators are a mix of contractors, consultants, and Civil Servants who are experts in their respective fields.
 - All evaluators read every proposal.
 - Evaluators are voting members of the TMC panel.
- Additionally, specialist reviewers may be called upon in cases where technical expertise that is not represented on the panel is needed.
 - Specialist reviewers read only those parts of a proposal that are specific to their expertise.
 - Specialist reviewers submit their findings to the TMC panel; they are not voting members of the panel.
- All conflict of interest (COI) policies, both individual and organizational, are enforced.



TMC Evaluation Process, cont'd.



II. Proprietary Information

- All proposal materials are considered proprietary.
- Accordingly, NASA's policies and procedures for protecting proprietary information will be applied to the handling and storage of these materials.
- Only those with a need to know will view Proposal materials.
- All persons who handle proposals must sign non-disclosure agreements before they receive proposals.



TMC Evaluation Process, cont'd.

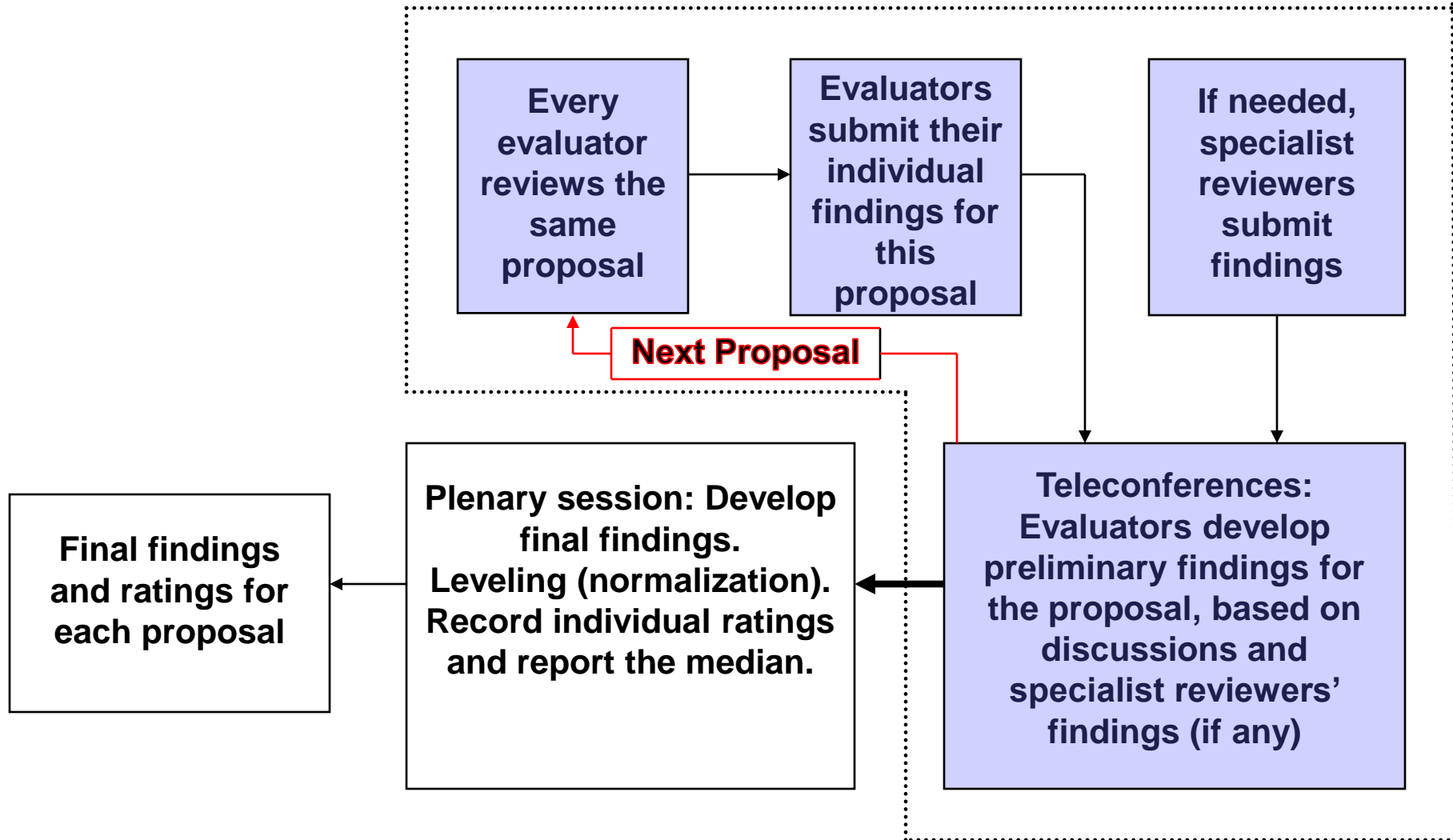


III. TMC Panel Procedure

- All evaluators consider each proposal individually, in sequence.
- If needed, specialist reviewers consider specific technical issues.
- Evaluators participate in secure teleconferences to develop preliminary findings.
- When all proposals have been evaluated, the evaluators convene in a plenary session to develop final findings and risk ratings.
- Ratings are normalized during the Plenary, to ensure that all proposals have been evaluated fairly and to identical standards.
- For each proposal, the TMC evaluation will result in one of three risk ratings:
 - **Low Risk:** No problems have been identified that cannot be solved well within the proposed project resources (*e.g.* schedule and cost). Success is likely.
 - **Medium Risk:** Significant problems have been identified, but the TMC panel judges that these can be solved within the proposed project resources by means of vigilant management and effective application of engineering resources. Success is possible.
 - **High Risk:** Problems have been identified that are of such magnitude that the panel judges they cannot be solved within the proposed project resources. Failure is likely.
- Supporting documentation is provided for these results.



TMC Evaluation Flow





Characteristics of Low-Risk Ratings



- The project team and each of its key participants have demonstrated competence, appropriate qualifications, and a clear commitment to execute the project.
- The project is self-managed, but provides reasonable visibility to NASA for oversight.
- The project team has thoroughly analyzed all project requirements and consequently the proposed resources are clearly adequate to cover the projected needs.
 - All risks have been/are being identified and managed by the team, with adequate plans to reduce or retire the risk before launch.
 - There are no risks that require either a workaround or a development and qualification plan.
 - Cost and schedule include adequate reserves to fix unforeseen problems that may arise.
- All contributed assets for the project are backed by letters of commitment.
- The team clearly understands the consequences of failing to meet technical, schedule, and/or cost commitments.



Characteristic of High Risk Ratings



- Technical Design Margins (Mass, Power, etc.)
 - Insufficient data provided to verify the margins.
 - No margins provided, or conflicting data provided.
 - Margins are deemed too low with respect to the level of maturity of the design.
- Cost
 - Concerns about cost reserves (*e.g.*, below AO requirement, too low based on identified liens/threats, phasing inconsistent with anticipated needs).
 - TMC unable to validate proposed cost
- Instrument Implementation
 - Unsubstantiated heritage claims
 - Development risks inadequately addressed.
 - Inadequate/inconsistent descriptions and details.
 - Inconsistencies between instrument requirements and bus capabilities.
- Complex Operations
 - More common in payloads with multiple instrument that required tight scheduling/sequential operations.
 - Challenges inherent in lander operations inadequately addressed.



Characteristic of High Risk Ratings

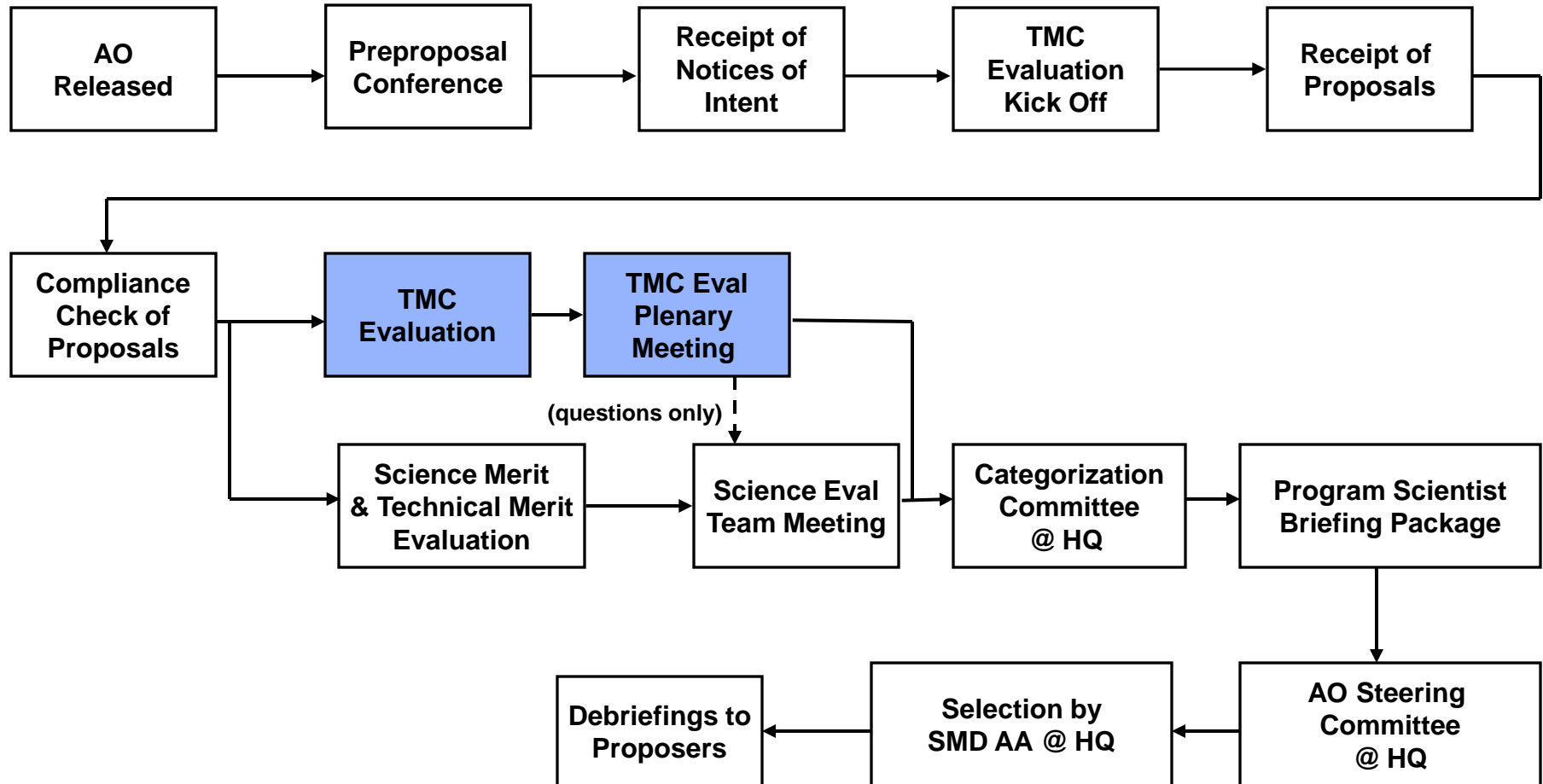


- Systems Engineering
 - Incomplete flow-down of science requirements to payload/flight system accommodations.
 - Inadequate description of how systems engineering functions will be executed.
 - Inadequate resources allocated to accomplish this function.
- Management Plans
 - Confusing/conflicting organizational roles and responsibilities.
 - Lack of demonstrated organizational/individual expertise for specified role.
 - Insufficient time commitments for key personnel.
- Schedules
 - Insufficient detail on which to base an independent assessment.
 - Inadequate/no schedule reserve identified.
 - Overly ambitious schedules that are not consistent with recent experiences.



Supplemental Slides

New Frontiers Proposal Evaluation Process





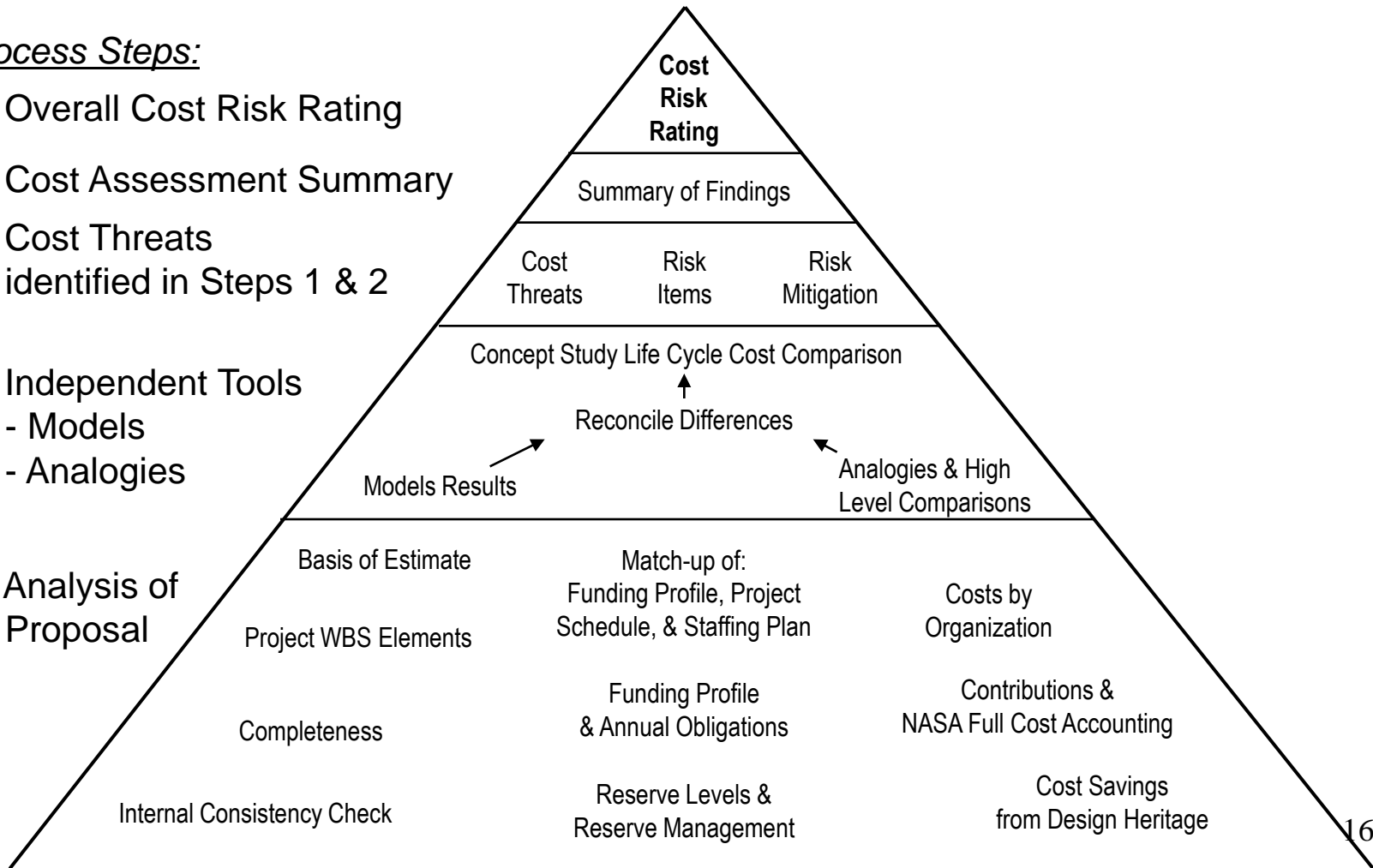
TMC Independent Cost Assessment



“The Pyramid”

Process Steps:

5. Overall Cost Risk Rating
4. Cost Assessment Summary
3. Cost Threats identified in Steps 1 & 2
2. Independent Tools
 - Models
 - Analogies
1. Analysis of Proposal





TMC Evaluation Factors and Sub-Factors

Generally, the degree to which Proposals address the following factors directly relates to the grade of Low, Medium, or High Risk:

- **Instrument**
 - Instrument Design, Accommodation, and Interface
 - Design Heritage
 - Environment Concerns
 - Technology Readiness
 - Instrument Systems Engineering
- **Mission Design and Operations**
 - Mass Margins
 - Trajectory Analysis
 - Launch Services
 - Concept of Mission Operations
 - Ground Facilities – New/Existing
 - Telecom
- **Flight Systems**
 - Hardware/Software Design
 - Design Heritage
 - Spacecraft Systems Design
 - Design Margins (Excluding mass)
 - Qualification and Verification
 - Assembly, Test, and Launch Operations
 - Mission Assurance
 - Development of New Technology
- **Management and Schedule**
 - Roles and Responsibilities
 - Team Experience and Key Individuals' Qualifications
 - Project Management and Systems Engineering
 - Organizational Structure and Work Breakdown Schedule (WBS)
 - International Participation
 - Risk Management, Including Descope Plan and Decision Milestones
 - Project-Level Schedule
 - Proposed Subcontracting Plans and SDB Participation.
- **Cost**
 - Basis of Estimate (BOE)
 - Cost Realism and Completeness
 - Cost Reserves by Phase
 - Comparison with TMC Estimates (Including Parametric Models/Analogies)